

## Quiz 8

Name:

Section:

Please box or circle your final answers.

1. Evaluate the following limits:

$$a. \lim_{x \rightarrow -\infty} \frac{e^{2x} - 8}{9 + 4e^{2x}} = \frac{0 - 8}{9 + 0} = -\frac{8}{9}$$

$$\lim_{x \rightarrow -\infty} e^{2x} = 0$$

$$b. \lim_{x \rightarrow \infty} \frac{x^4}{2^x} = 0 \quad 2^x \text{ grows faster than } x^4$$

2. Find the derivative of  $f(x) = x^6 e^{2x-8}$ .

$$6x^5 e^{2x-8} + x^6 e^{2x-8} \cdot 2$$

3. Find the derivative of  $f(x) = e^{(8x^2-4x+10)^4}$ .

$$e^{(8x^2-4x+10)^4} \cdot 4(8x^2-4x+10)^3 \cdot (16x-4)$$

4. A pollutant has a half-life of 600 years, if 300 grams were found how long will it take for it to decay down to 100 grams?

$$300 e^{600r} = 150$$

$$e^{600r} = \frac{1}{2}$$

$$600r = \ln\left(\frac{1}{2}\right)$$

$$r = \frac{\ln\left(\frac{1}{2}\right)}{600}$$

$$r \approx -0.0012$$

$$100 = 300 e^{-0.0012t}$$

$$e^{-0.0012t} = \frac{100}{300} = \frac{1}{3}$$

$$-0.0012t = \ln\left(\frac{1}{3}\right)$$

$$t = \frac{\ln\left(\frac{1}{3}\right)}{-0.0012} \approx 915.5$$

about  
916 years

## Quiz 09

Name:

Section:

Please box or circle your final answers.

1. Find  $f'(x)$ , do **not** simplify. Remember that  $\log_b(uv) = \log_b(u) + \log_b(v)$ , and  $\log_b\left(\frac{u}{v}\right) = \log_b(u) - \log_b(v)$ .

a.  $f(x) = 5^{6x^2-9x+3}$  (2 pts)

$$f'(x) = 5^{6x^2-9x+3} \cdot \ln(5) \cdot (12x-9)$$

b.  $f(x) = \log_3\left(\frac{x^3-9x^2+8x}{x^6-9x+3}\right)$  (2 pts)  $= \log_3(x^3-9x^2+8x) - \log_3(x^6-9x+3)$

$$f'(x) = \frac{1}{x^3-9x^2+8x} \cdot \frac{1}{\ln(3)} \cdot (3x^2-18x+8) - \frac{1}{x^6-9x+3} \cdot \frac{1}{\ln(3)} \cdot (6x^5-9)$$

c.  $f(x) = \ln((6x^4+7x^{-3})^8(8x^2-4x+10))$ . (2 pts)

$$f(x) = 8 \ln(6x^4+7x^{-3}) + \ln(8x^2-4x+10)$$

$$f'(x) = 8 \cdot \frac{1}{6x^4+7x^{-3}} \cdot (24x^3-21x^{-4}) + \frac{1}{8x^2-4x+10} \cdot (16x-4)$$

2. Compute  $\int(8x^3 - \frac{4}{x} + e^x + 3)dx$  (4 pts)

$$= 8 \int x^3 dx - 4 \int \frac{1}{x} dx + \int e^x dx + \int 3 dx$$

$$= 8 \frac{x^4}{4} - 4 \ln|x| + e^x + 3x + C$$

$$= 2x^4 - 4 \ln|x| + e^x + 3x + C.$$